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Vice President
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May 4, 2010

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2010 MAY -4 P 4:12
PUBLIC UTILITIES COMMISSION

The Honorable Chairman and Members of the
Public Utilities Commission of the State of Hawaii
465 South King Street, First Floor
Honolulu, Hawaii 96813

Dear Commissioners:

Re: Docket No. 2008-0303 (AMI Project) – Procedural Plan, Request to Defer Certain Costs of AMI Extended Pilot Testing, and Update on Developments

Pursuant to the Commission's letter dated April 15, 2010, the Hawaiian Electric Companies[1] respectfully submit their (1) Procedural Plan, (2) Request to Defer Certain Costs of AMI Extended Pilot Testing, and (3) update on developments in the Smart Grid, Customer Information System ("CIS") and cyber-security areas.[2]

The Hawaiian Electric Companies propose that the Commission suspend the remaining procedural steps scheduled in this docket (the submission of and response to information requests ("IRs"), the filing of supplemental testimonies, and the evidentiary hearing and post-hearing briefs) pending the completion of the proposed Extended Pilot Testing (or "Pilot Phase") of the planned Advanced Metering Infrastructure ("AMI") project, which is described below, and the submission of a report by the Companies with respect to the results of the Pilot Phase.

The plan for the Extended Pilot Testing includes (1) the installation of approximately 5,000 additional AMI meters (at an estimated capital cost of $652,651), (2) the installation of two "mini-TGB" network devices (at an estimated expense of $30,000) to supplement the five existing Tower Gateway Base Stations ("TGBs") installed pursuant to prior AMI pilot activities, (3) the installation of a Meter Data Management System ("MDMS") for the extended pilot

[1] Hawaiian Electric Company, Inc. ("Hawaiian Electric" or the "Company"), Maui Electric Company, Limited ("MECO") and Hawaii Electric Light Company, Inc. ("HELCO") (Hawaiian Electric, HELCO and MECO are collectively referred to as the "Hawaiian Electric Companies" or "Companies".

[2] The other parties to this proceeding include the Division of Consumer Advocacy of the Department of Commerce and Consumer Affairs (the "Consumer Advocate"), Life of the Land ("LOL"), the Hawaii Renewable Energy Alliance ("HREA") and the Hawaii Solar Energy Association ("HSEA"). The April 15, 2010 letter permits the other parties to file responses to the Companies' proposal by May 11, 2010.

testing, which will involve (a) installing additional computer server capacity (at an estimated capital cost of $43,600), (b) a software hosting fee, which includes all MDMS vendor hosted services and materials such as MDMS licensing fees, MDMS installation and configuration, and support and maintenance fees (at an estimated expense of $320,000), and (c) third-party system integrator costs (at an estimated expense of $250,000), and (4) cyber-security and technical support consultant costs (at an estimated expense of $500,000 and $250,000, respectively).

The Extended Pilot Testing is designed to provide a comprehensive test and evaluation process, where applicable performance criteria will be addressed. Performance in the Extended Pilot Test will alleviate (but not replace) the need for previously planned acceptance testing called for in the Advanced Metering Infrastructure Equipment and Services Agreement between the Hawaiian Electric Company, Inc. and Sensus Metering Systems, Inc. ("Sensus"), executed on October 1, 2008, ("Sensus Agreement") while giving Hawaiian Electric the additional time and opportunity necessary to (1) plan for integration with a new CIS, (2) assess the role of AMI in Smart Grid initiatives and (3) identify and address cyber-security concerns, all of which are pre-requisites for large-scale AMI deployment. Under the preliminary project schedule for the Extended Pilot Testing, planning activities and lab-scale Functional Acceptance Testing ("FAT") and System Acceptance Testing ("SAT") testing would take place in 2010, while hardware and software procurement, installation and field testing would occur in 2011. At the conclusion of the Extended Pilot Testing, the Hawaiian Electric Companies will submit a report to the Commission that would provide a summary and details of the testing, as well as the costs incurred.

The Companies respectfully request authorization to defer the incremental network costs ($30,000), the non-capital MDMS costs (the software hosting fee of $320,000 and the third-party system integrator costs of $250,000), and the cyber-security and technical support consultant costs ($750,000) incurred in conducting the proposed Pilot Phase, for a total estimated deferred cost of $1,350,000. (The deferred costs will be allocated among the Hawaiian Electric Companies based on the customer counts for each of the utilities.) The mechanism used to recover the deferred costs would be determined at the time approval of the commitment of expenditures for the AMI Project is granted, or at the time a request is made for recovery of the costs if approval of the commitment of expenditures is not provided, or if the AMI Project does not proceed. The approval to defer the costs would not imply approval of a specific level of expenditures, since the costs would be subject to later review for prudence and reasonableness.

No special accounting treatment is requested for the meters or the computer servers installed to conduct the Extended Pilot Testing, or for the costs of removing existing meters and repairing any meter boxes that are already damaged or that are damaged in the removal and replacement process for the Extended Pilot Testing.

This submission includes an update on developments in the Smart Grid, CIS and cyber-security areas, which is attached as Exhibit A. The Hawaiian Electric Companies intend to submit a report on their Smart Grid Roadmapping efforts by the end of June 2010. Further developments with respect to the CIS would be reported in the CIS Docket, Docket No. 04-0268.

Further developments with respect to cyber-security issues associated with the AMI project would be addressed in the report on the Extended Pilot Testing.

I. BACKGROUND

The Hawaiian Electric Companies filed their application in Docket No. 2008-0303 for approval of their proposed AMI project (and recovery of the AMI project costs) on December 1, 2008 ("Application"). Following the filing of IRs, IR responses and written testimonies, the matter was scheduled for hearing during the week of September 28, 2009.[3]

AMI refers to the system infrastructure that measures, collects and analyzes energy usage, on a pre-defined schedule or "on demand" basis. This infrastructure includes hardware, software, and communication systems, ultimately linking customer premise advanced electricity meters to utility-located systems. AMI provides two-way communications between the meters and systems through a two-way radio frequency network infrastructure ("AMI Network") to obtain consumption reads and voltage status at individual premises much more frequently than the Companies' existing monthly meter reading cycles.

AMI (sometimes referred to as an "AMI system") includes (1) "advanced" customer meters or "smart meters", (2) a two-way communication system to transmit data from the meters to the utility's CIS and the computer systems, and to transmit instructions from the utility's computer systems to the meters, and (3) a MDMS to manage the collection of data from the smart meters and to interface between the two-way communication system and the utility's computer systems.[4]

By letter dated and filed August 28, 2009, the Hawaiian Electric Companies requested that the dates for the prehearing conference and evidentiary hearing in the docket be extended to June 2010. The additional time was intended to allow the Companies (1) to complete their Smart Grid roadmapping effort (so they could better indicate how the proposed AMI project will facilitate the roadmaps), and (2) to assess the impact, if any, of ongoing developments with respect to their new CIS and cyber-security.

By letter dated September 14, 2009, the Commission granted the request, with certain modifications. The letter provided revised deadlines for (1) IRs to parties (May 11, 2010); (2) responses to IRs (June 1, 2010); (3) parties' supplemental written testimonies (June 22, 2010); (4) the prehearing conference (the week of July 6, 2010, subject to the call of the Commission);

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[3] See Commission's *Order Approving Stipulated Procedural Order, as Modified*, filed April 21, 2009.

[4] The MDMS consists of computer software, and computer hardware to operate the software and to collect and store data. The MDMS hardware consists of computer servers (application, web, and database), networking equipment, and the associated computer operating system. The MDMS provides a database repository that automates and streamlines the complex process of collecting meter data from multiple collection technologies and delivering that data in the appropriate format to the billing system. Specific MDMS functions include: (1) collection system integration; (2) validation, estimation and editing; (3) versioned data storage; (4) calculation and aggregation; and (5) data exports and interfaces.

(5) the evidentiary hearing (week of July 12, 2010, subject to the call of the Commission); and
(6) simultaneous opening and reply briefs.

At a Status Conference held on April 13, 2010, the Companies briefly reported on the status of developments in the Smart Grid, CIS and cyber-security areas, indicated that they were working with their AMI vendor, Sensus, on plans to conduct an extended pilot testing phase before proceeding with implementation of the AMI project, and stated that they intended to request authorization to defer certain costs arising out of the extended pilot testing phase. By letter dated April 15, 2010, the Commission suspended the deadlines described in its letter dated September 14, 2009, "unless indicated otherwise by the commission." As discussed at the Status Conference, the letter directs the Hawaiian Electric Companies to submit their proposal for a revised procedural plan to address the issues raised in this docket by May 4, 2010, "which should describe the status of relevant matters and explain the reasons for all aspects of the proposal."

II. EXTENDED PILOT TESTING

Prior Pilot Tests

As indicated in the AMI Application, the Hawaiian Electric Companies conducted three AMI pilot projects prior to filing the application, including: (1) an initial investigation into the functionality of Sensus AMI technology with 500 AMI meters on Oahu and two TGB sites located atop the Prince Kuhio Hotel in Waikiki and the Five Regents condominium in Salt Lake; (2) an investigation into the ability of Sensus' AMI technology to collect data reliably for monthly billing purposes in three meter reading routes, involving over 3,000 residential and commercial meters in the Ocean Pointe area along with a third TGB tower at Mauna Kapu in the Makakilo area; and (3) the addition of two more TGB sites at Koko Head and Pu'u Papa'a, involving approximately 400 residential meters to collect baseline electricity profiles to support a Dynamic Pricing Pilot program. The application also indicated that Hawaiian Electric was continuing to evaluate, develop and demonstrate AMI (including MDMS products) as part of the Companies' pilot projects.

The primary focus of the prior pilot projects was to demonstrate Sensus' ability to provide radio frequency ("RF") coverage in urban and rural applications, test the ability of third party contractors to install the meters, and demonstrate the capability to reliably and accurately deliver timely monthly billing reads and interval data and execute two-way commands.

Since the filing of the AMI Application, the Hawaiian Electric Companies and Sensus continued to operate and observe the performance of a pilot AMI system on Oahu. Testing in the pilots has been limited to those features that were available to test rather than the entire range of functions and performance levels that will be required in the full-scale AMI system. Nonetheless, this work has allowed both the Companies and Sensus to exercise and evaluate

some of the desired functionality of the Sensus FlexNet technology while identifying various product and performance issues.

During this continued performance monitoring, a number of significant issues were identified, which has prompted a change in the Companies' original AMI project implementation plans. After discussions with Sensus, these issues formed the basis for an initiative begun in the first quarter of 2010 that is designed to increase the velocity at which such issues are addressed, and to allow open discussions of new issues that arise in the future. Resolutions to some of the identified issues are scheduled to be tested in 2010 with currently available Sensus software and hardware;[5] however, many issues must be assessed using products that will be employed on a larger scale. Some of these products (both hardware and software) are now being developed by Sensus.

During this same time period, the Companies and Sensus have found it important to address critical cyber-security requirements, to evaluate the intersection of AMI and Smart Grid technologies, to examine the necessary interfaces with the new CIS, and to consider the rapid evolution of national standards that are impacting all of these areas. These issues and challenges have prompted the Companies to consider a period of Extended Pilot Testing and to develop a revised project plan, particularly in light of the magnitude and duration of this potential investment.

Scope of the Extended Pilot Testing

Hawaiian Electric and Sensus have agreed that an extended pilot testing phase is necessary before committing to a full AMI system deployment in order to be able to evaluate the full performance of the Sensus AMI system using the actual products to be installed in the full-scale AMI deployment against all the requirements of an amended Sensus Agreement that will apply to a fully deployed system.

Upon successful completion of the current testing, Extended Pilot Testing is designed to provide a comprehensive test and evaluation process, where all performance criteria in the Sensus Agreement will be addressed. Performance in the Extended Pilot Test will alleviate (but not replace) the need for previously planned acceptance testing called for in the Sensus Agreement, while giving Hawaiian Electric the additional time and opportunity necessary to (1) plan for integration with a new CIS, (2) assess the role of AMI in Smart Grid initiatives and (3) identify and address cyber-security concerns, all of which are pre-requisites for large-scale AMI deployment.

In order to provide a suitable meter population and time period to evaluate the ability of the FlexNet technology to support full-scale deployment, the Companies estimate the need to

[5] In 2010, areas that Sensus considers to be resolved (such as meter demand reset, data anomalies, and RF interference) will be tested in a limited test area in Kalihi, using the latest available Sensus residential and commercial/industrial ("C&I") meters. Hawaiian Electric also will continue to monitor these issues in the Extended Pilot Testing.

install approximately 4,300 residential meters and 700 commercial and industrial ("C&I") meters on Oahu. The proposed Extended Pilot Testing deployment area will center around the downtown Honolulu area and expand outwards in all directions to cover diverse geographic areas (flat areas, valleys, mountains) and in wide-ranging building types (high rise, low rise, residential, commercial, light industrial), building construction (concrete, wood, metal, etc.) and enclosures, and in varying radio frequency environments.

In addition to meters, the hardware and software installed in the Extended Pilot Testing would include: (1) TGBs and additional TGB backhaul; (2) necessary versions of the Sensus Regional Network Interface ("RNI") software needed for the FlexNet system to meet agreed-upon performance requirements; and (3) a MDMS (not a Sensus product) and automated reporting tools to allow efficient data capture and performance reporting.

To prepare for Extended Pilot Testing, the Companies' are developing requests for proposals for the MDMS and a System Integrator ("SI") who will be responsible for AMI-to-MDMS integration. This activity will build on previous MDMS pilot and demonstration activities conducted by Hawaiian Electric. Upon Commission approval of Extended Pilot Testing, the Companies would competitively select the MDMS and SI vendors to allow the MDMS implementation to be initiated as soon as possible. Meter procurement and installation would occur in parallel to MDMS selection and implementation to allow the timely deployment of hardware and software for the Extended Pilot Testing.

Specific areas of focus and monitoring in the Extended Pilot Testing are identified in the *Advanced Metering Infrastructure (AMI) Project Extended Pilot Testing* document, which is attached as Exhibit B. In general, the Extended Pilot Testing would focus on: (1) integrating the Sensus AMI system and the MDMS; (2) resolution of apparent data anomalies; (3) observing "as-received" failure rates and failure statistics for fielded equipment; (4) observing product delivery and ordering and return material authorization ("RMA") processes; (5) testing of all mass deployment necessary hardware, software, firmware, handheld installation tools and remote-disconnect meters; (6) evaluating all systems, processes and methodologies required in a mass deployment; (7) assessing Sensus' ability to deploy, operate and maintain network assets in a mass deployment; and (8) sensitivity testing at various AMI network traffic levels and operational scenarios.

Sensus Participation in the Extended Pilot Testing

To support Hawaiian Electric's expanded testing, Sensus plans to install additional radio base stations (TGBs) at two sites. Three TGBs using sectorized antennae will be installed at a new downtown Honolulu location and two additional sectorized antennae will be added to the existing Prince Kuhio location. Upgrades of the Prince Kuhio site would be accomplished in a short timeframe and the acquisition and installation of equipment at the new radio base station site would be performed in parallel with procurement activities, test plan development and meter installations. In addition, the Companies anticipate that two "mini-TGBs" may be installed at remote locations where it would not be cost-effective to install full-scale TGBs. If that occurs,

the Hawaiian Electric Companies would pay for the installation of the mini-TGBs, but the network services costs for the additional TGBs and the mini-TGBs would be included in the $180,000 per year that Hawaiian Electric is incurring for the five existing TGBs.

To facilitate the execution of the Extended Pilot Testing, Sensus has agreed to continue to provide over three full time equivalent resources along with all necessary support resources needed to successfully complete testing.[6]

Objective of the Extended Pilot Testing

The objective of the Extended Pilot Testing is to ensure that the AMI system will deliver the required functionality while meeting required specifications. During the Extended Pilot Testing, Hawaiian Electric will have the opportunity to test all components and features of the Sensus AMI System.[7] The acceptance tests to be conducted as part of the Extended Pilot Testing would include: (1) Functional Acceptance Testing ("FAT") to verify proper installation and configuration, and that individual AMI System components meet specified requirements; (2) System Acceptance Testing ("SAT") to verify performance, functionality and proper integration of the AMI System; and (3) "Availability Testing" to verify that the AMI System meets operational availability requirements.

Schedule for the Extended Pilot Testing

Under the preliminary project schedule for the Extended Pilot Testing, planning activities and lab-scale FAT and SAT testing would take place in 2010, while hardware and software procurement, installation and field testing would occur in 2011.

Meter procurement and installation would occur in parallel with MDMS selection and implementation to allow for timely deployment of hardware and software for the Extended Pilot Testing. FAT testing would be a combination of laboratory and field tests. Initial onsite FAT and SAT testing that can be performed in a lab setting would start in the third quarter of 2010, while field FAT and SAT testing would be conducted over a one-year period starting in 2011. The total project timeline would be approximately 18 months from mid-2010.

Outcome of Extended Pilot Testing

It is anticipated that for each part of the acceptance tests (FAT, SAT and Availability Test), a pass/fail score would be generated by Hawaiian Electric. In order to pass these tests,

[6] Sensus has agreed to continue to provide an onsite project manager and IT project manager as well as Network Operations Center personnel and RF interference mitigation contractors. Sensus has also assigned a senior Director of Engagement to manage all aspects of the relationship. Sensus will also provide subject matter experts needed to resolve any issues identified during testing.

[7] During the Extended Pilot Testing, the MDMS will be integrated with the RNI that Sensus maintains in Dallas, Texas to collect and store data from the TGBs, and to provide network management, performance statistics and user interfaces such as website access and geospatial presentation of data. When the full-scale AMI project is implemented, the RNI would be located at a Hawaiian Electric data center.

Sensus would need to demonstrate the timely ability to meet all of the agreed-upon functional specifications of the AMI System and achieve persistent performance levels per the specifications. Successful completion of the Extended Pilot Testing by Sensus would confirm whether and to what extent the Sensus technology is capable of providing the necessary AMI functionality required by Hawaiian Electric.

At the conclusion to the Extended Pilot Testing, the Hawaiian Electric Companies will submit a report to the Commission that would provide a summary and details of the testing, as well as the costs incurred.

Sensus Agreement

A copy of the Sensus Agreement was filed on May 4, 2009, as Confidential Exhibit 1A to the Application, pursuant to the Protective Order filed April 15, 2010 ("AMI Protective Order"). (A summary of the Sensus Agreement was provided as Exhibit 1 to the AMI Application.) The Hawaiian Electric Companies and Sensus are discussing the amendments to the Sensus Agreement that are needed to incorporate the Extended Pilot Testing.[8] The Sensus Agreement, as amended (the "Amended Agreement"), will be filed pursuant to the AMI Protective Order.

Additional Benefit of Extended Pilot Testing

The Extended Pilot Testing schedule will provide the Hawaiian Electric Companies with an enhanced opportunity to take advantage of lessons learned by other utilities and AMI vendors in their implementation of AMI. Some of these lessons involve solutions as simple as obtaining the necessary technical and operational documentation from the AMI vendor or publishing a list of contacts to call during AMI meter deployment (as encountered by Alliant Energy). Other recommendations have concerned specific technologies, such as electric vehicles ("EVs") (in connection with which, Silver Spring Networks has noted that there may be a need to influence the time of day at which consumers charge the EVs). As another example, Portland General Electric discovered that approximately 1-2% of its customers required meter socket repairs on the customer side of the meter. In addition, experiences at Pacific Gas & Electric and Oncor have highlighted the importance of educating customers in advance about the future deployment of AMI meters and avoiding deployment at times where bills are traditionally high (i.e., during the summer). In these specific utility cases, complaints and lawsuits were motivated by customers with excessive bills that they believed were the result of inaccurate AMI meters. Alliant Energy learned that the communications team must coordinate the design of the AMI Network with end users who are expecting to receive interval data instead of just monthly read data.

[8] An exhibit to the Amended Agreement will provide guidance on test plans, procedures, and documentation as well as the roles and responsibilities of Hawaiian Electric and Sensus. Specific test plans and procedures will be mutually developed and agreed by Hawaiian Electric and Sensus in collaboration to guide the proposed testing. The results of the testing will be documented and provide a means to evaluate the Sensus AMI System's ability to achieve the required functionality and performance levels. Each test procedure will define the pass/fail criteria.

While the foregoing examples are far from being an exhaustive list of lessons learned from previous AMI rollouts, they are illustrative of how, with the passage of time, accumulated expertise in the implementation of AMI could result in substantial enhancements to the Hawaiian Electric Companies' broader AMI installation.

III. REQUEST TO DEFER CERTAIN EXTENDED AMI PILOT TESTING COSTS

AMI Pilot Cost

The following hardware and software would be installed in the Pilot Phase:

- 5,000 additional residential and C&I meters, TGBs (including sites using TGBs with multi-sector antennae), mini-TGBs and additional TGB backhaul to reliably support Extended Pilot Testing. This may include additional network analysis and propagation studies by Sensus to determine suitable locations for the network hardware.

- Necessary versions of the Sensus RNI software needed for the FlexNet system to meet performance requirements of the Amended Agreement.

- MDMS and automated reporting tools to allow efficient data capture and performance reporting (via existing and new Sensus and third-party software tools).

The estimated cost of the Pilot Phase is shown in Exhibit C. The nature of these costs is described below.

Meters

AMI Meters

As stated in the Application, approximately 7,700 AMI meters had been deployed as of November 10, 2008.[9] The present AMI meter population now stands at approximately 9,400 Sensus meters.

For the Pilot Phase, Hawaiian Electric plans to install an additional 5,000 AMI meters (4,300 residential meters and 700 C&I meters) at an estimated cost of $652,651.

Existing Meters

The cost of removing the existing meters that will be replaced by the 5,000 AMI meters is estimated to be $57,874.

Meter Boxes

When new meters are installed, meter boxes that are already damaged, or that are damaged in removing the old meters, have to be replaced or repaired. The estimated cost of repairing damaged meter boxes, based on an assumed occurrence rate of 0.5% and a $2,000 cost for each occurrence, is estimated to be $43,485.

Meter Failures

During the test period, the AMI meters will be covered under warranty except for the labor costs associated with replacing the failed meter, which would be expensed as incurred. AMI meter failure rates are estimated at $971 based on a 1% annual failure rate.

Network Costs

The current population of AMI meters is supported by a network of five TGBs, and a back end Sensus software system called the Regional Network Interface (RNI) located at a datacenter in Texas. The TGBs operate in an FCC-licensed band in the vicinity of 900 MHz.

At the present time, the five existing TGBs are located at sites: (1) atop the Prince Kuhio Hotel in Waikiki; (2) atop the Five Regents condominium in Salt Lake; (3) at Mauna Kapu in the Makakilo area; (4) at Koko Head; and (5) at Pu'u Papa'a.[10] The cost of the network services for the TGBs and related network costs are $3,000 per TGB per month, or $180,000 total per year.

To support Hawaiian Electric's expanded testing, Sensus plans to install five additional TGBs using sectorized antennae at two sites – three at a new downtown Honolulu location and

[9] Application, page 18.
[10] Application, page 18 and Exhibit 5. See also response to CA-IR-158 in Docket No. 2008-0083 (Hawaiian Electric's 2009 test year rate case).

two more at the existing Prince Kuhio location. Upgrades of the Prince Kuhio site would be accomplished in a short timeframe and the acquisition and installation of equipment at the new radio base station site would be performed in parallel with procurement activities, test plan development and meter installations.

Although Hawaiian Electric's expanded testing will increase the total number of TGB leases from five to ten, the total lease expense for all network services (including any mini-TGBs) will continue to be $180,000. However, the estimated incremental network cost for the expanded testing is $30,000. The additional $30,000 in cost represents the installation cost of two mini-TGBs (which installation cost would be borne by Hawaiian Electric).[11] The purpose of the mini-TGB network devices would be to provide network services in remote areas where it would be economically impracticable to install full-sized TGBs.

MDMS

MDMS Costs

The costs for the hosted MDMS for the Extended Pilot Testing can be grouped into the following categories: (1) hardware, including the operating system cost; (2) software hosting service; and (3) integration. Hardware to support the Extended Pilot Testing, consisting of application, web and database servers, is estimated at $43,600. The software hosting fee, which includes all MDMS vendor hosted services and materials such as MDMS licensing fees, MDMS installation and configuration, and support and maintenance fees throughout the Extended Pilot Testing, is estimated to cost $320,000. The third-party integration costs, which include all costs to integrate the hosted MDMS to the Sensus AMI system, are estimated to be $250,000. The total Extended Pilot Testing MDMS costs are estimated at $613,600.

Deferred MDMS Costs

The estimated non-capital cost of the MDMS to support the Extended Pilot Testing is estimated to be $570,000.

Cyber-Security and Technical Support Consultant Costs

The costs of the cyber-security and technical support consultants are estimated to be $500,000 and $250,000, respectively. The cyber-security consultant will perform security penetration testing of hardware, software, processes and systems and provide an assessment of any potential vulnerabilities in the Sensus AMI system. The technical support consultant will

[11] The cost of leasing any mini-TGBs would be included in the $180,000 cost per year to cover the lease expense for the ten TGBs. Hawaiian Electric's 2009 test year expenses included $123,000 (41 months of lease rent payments at $3,000 per month) in research and development expenses for four of the TGBs, and $36,000 (12 months of lease rent payments at $3,000 per month) in transmission and distribution operating expenses for the TGB installed at Mauna Kapu to support the Ocean Pointe subdivision. See response to CA-IR-158 in Docket No. 2008-0083. The $180,000 is the equivalent of 12 TGBs x 12 months x $3,000/month, or 60 TGB-months x $3,000/month.

advise the Companies with test plans and procedures and provide expert knowledge of RF communications, including RF interference issues.

Request to Defer Certain Costs for the Pilot Phase

The Hawaiian Electric Companies respectfully request authorization to defer the costs of the outside consulting services of $750,000, the non-capital MDMS costs (including software licensing costs) of $570,000 and the incremental network costs of $30,000 incurred in conducting the proposed Pilot Phase, for a total of $1,350,000. The mechanism used to recover the costs would be determined at the time approval of the commitment of expenditures for the AMI Project is granted, or at the time a request is made for recovery of the costs if approval of the commitment of expenditures is not provided, or if the AMI Project does not proceed.[12] The approval to defer the costs would not imply approval of a specific level of expenditures, since the costs would be subject to later review for prudence and reasonableness. This is consistent with the guidance provided by the Commission in its *Decision and Order* ("D&O") issued December 11, 2009 in Docket No. 2009-0162 ("Big Wind Studies D&O"), in which the Commission allowed Hawaiian Electric to defer costs for the "Big Wind Implementation Studies" for later review for prudence and reasonableness.

The alternative to deferring the Extended Pilot Testing costs for later recovery would be to include the non-capital costs for the Pilot Phase as expenses in the 2011 test year rate case for Hawaiian Electric (that the Company committed to file in the decoupling docket). However, since all of these costs are expected to be incurred in 2011, and it would be reasonable to incorporate the costs in the AMI Project costs if the project proceeds, as expected, it is preferable to defer the costs at this time.

The meters installed as part of the Extended Pilot Testing will become the billing meters for the customers where the meters are installed, and will be included in plant in service when installed.

No special accounting treatment is requested for the meters installed in the Extended Pilot Testing (such as amortization of the capital costs over a shorter period than the normal depreciation period).

The cost of the servers will be added to plant in service when the servers are installed, and no special accounting treatment is requested for the servers. Hawaiian Electric adds server capacity to its system on an on-going basis, and will continue to use the server capacity after the Extended Pilot Testing.

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[12] For example, if commitment of expenditures for the AMI Project is approved, then the deferred costs could be incorporated in the cost of the project at that time, and ultimate recovery of the costs would be made using the mechanism(s) approved for recovery of the AMI Project costs. If approval of the commitment of expenditures is not provided, or if the AMI Project does not proceed, then the costs could be incorporated in the Company's revenue requirements in its following rate case, which is currently expected to use a 2014 test year based on the three-year cycle proposed in the decoupling docket.

The costs of repairing any meter boxes that are already damaged or that are damaged in the removal and replacement process for the Extended Pilot Testing, will be accounted for as distribution operation expense, and will be expensed in the year incurred. The costs of removing the existing meters would be reflected as cost of removal as a charge to accumulated depreciation, consistent with the accounting for the costs associated with retiring or replacing other assets. The labor costs for the AMI Group incurred in the Extended Pilot Testing also will be accounted for as distribution operation or administrative expenses, and will be expensed in the year incurred. No special accounting treatment for these costs is requested.

Allocation of Deferred Costs among Hawaiian Electric Companies

The allocation of the costs of the Extended Pilot Testing among the Hawaiian Electric Companies is shown in Exhibit C. The capital costs of the AMI meters, the costs of replacing damaged meter boxes, and the costs of removing existing meters, are Hawaiian Electric costs, as all of the meters are being installed on Oahu, and will be used as the revenue meters for the customers where the meters are installed. The incremental network costs of $30,000 also will be a Hawaiian Electric cost, as they would be additions to the TGBs located on Oahu.

The MDMS capital cost for the servers necessary for the extended pilot testing of $43,600 will be included as a capital cost at Hawaiian Electric as the servers are only being required for the testing on Oahu. The deferred MDMS costs of $570,000 and the deferred consultant costs of $750,000 will be allocated among the Hawaiian Electric Companies as follows: (1) Hawaiian Electric – 67.46%, (2) HELCO – 17.59%, and (3) MECO – 14.95%. The percentages are derived from customer counts for each of the utilities. The efforts for MDMS testing work will benefit all of the Hawaiian Electric Companies, and thus the costs are being allocated amongst the Companies.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,

Darcy L. Endo-Omoto
Vice President
Government and Community Affairs

cc: Division of Consumer Advocacy
Hawaii Renewable Energy Alliance
Hawaii Solar Energy Association
Life of the Land

SMART GRID

Smart Grid capabilities are comprised of a broad array of electric system functions and services that can be enabled through enhanced communications and information technology. These capabilities are aimed to improve the reliability, security, and efficiency of an electric power system that includes large generation, the delivery systems, electricity consumers, and a growing number of distributed-generation and energy storage resources. Information and communications technologies can be applied to dynamic optimization of electric system operations, maintenance, and planning.[1] In time, resources and services that were separately managed can be integrated and bundled to address traditional problems in new ways, adapt the system to tackle new challenges, and discover new benefits that have transformational potential.

The increased grid intelligence and communications that can transform the way utilities operate their systems and interact with their customers will also need to develop and evolve in a measured and cost effective manner. As new equipment, integrating technologies and operating and security standards are being developed, a measured approach to developing increased Smart Grid capabilities is suggested.

Hawaiian Electric and its subsidiaries, Maui Electric Company, Limited ("MECO") and Hawaii Electric Light Company, Inc. ("HELCO") are currently developing Smart Grid roadmaps that start with an assessment of the current state of their systems[2] and identify the opportunities over time for Smart Grid technologies to help the Hawaiian Electric Companies[3] address issues such as renewable energy integration, improved reliability, cost of service, and safety. Through

[1] The American Recovery and Reinvestment Act of 2009 (Pub. L. No. 111-5) ("ARRA"), which was enacted in February 2009, has greatly accelerated the development of Smart Grid technologies.

[2] This assessment serves to orient the consultant with technologies already installed on the utilities' grids and serves as the starting point or foundation to build the smart grid technology roadmap.

[3] Hawaiian Electric, MECO and HELCO are collectively referred to as the "Hawaiian Electric Companies" or "Companies".

a competitive selection process, the Hawaiian Electric Companies retained Accenture in December, 2009, to develop their Smart Grid roadmaps. While the roadmaps are not yet complete, they will identify a long-term vision for Smart Grid development for each of the utilities, the foundational infrastructure and technology needs for the Smart Grid vision to be realized over time, and the near-term initiatives and their interdependencies. The road mapping exercise will also call out the more detailed assessments and additional analysis necessary for identified near-term initiatives prior to project initialization.[4]

An element within the Smart Grid road map for the Hawaiian Electric Companies is the proposed AMI project. Among the aspects of the AMI project assessed in the road mapping effort is the interaction between AMI technology and other desired Smart Grid capabilities to improve interoperability of assets and leverage the selected AMI technology going forward. An AMI system can play a meaningful role in the development of an intelligent grid by providing a far reaching communications platform and information technologies to enable capabilities such as demand response through time of use rates or other event driven pricing structures. AMI systems also have the potential to enable advanced capabilities such as customer load control, enhanced fault and outage management, advanced distribution operations monitoring, and expanded asset condition monitoring and management.

While these more advanced capabilities associated with AMI systems are in the development stage industry wide, AMI implementation should proceed following successful extended piloting of the technology, notwithstanding that all of the Smart Grid interoperability "answers" are not yet fully known with certainty. As with most other technologies that comprise

[4] The Companies will seek necessary Commission approval for projects at the appropriate time and the applications for approval will include a discussion of the interdependencies and relationship of the project for which approval is being sought and other related elements of the larger set of Smart Grid technologies and capabilities.

the Smart Grid of the future, the evolution of AMI technology will continue to rapidly advance. Such technology advancements across the entire Smart Grid landscape will require flexible and scalable AMI technologies that can operate effectively with both legacy systems and emerging new technologies.

CUSTOMER INFORMATION SYSTEM

The implementation of the Customer Information System ("CIS") affects the selection and integration of the Meter Data Management System ("MDMS") for the AMI project, as well as the timing of the Hawaiian Electric Companies' ability to offer large-scale time of use rate options in conjunction with the AMI project.

The AMI system will require new business processes to be defined, developed and reviewed. In turn, these new business processes will drive the configuration and integration requirements between the CIS, AMI head end system and the future MDMS. As part of initial MDMS requirements development, the Hawaiian Electric Companies identified AMI, MDMS and CIS, as well as other business systems as the system of record for specific data elements. Key information must be shared between these systems of record and identifying the specific data that must be synchronized is a lengthy and critical process that will occur during initial AMI integration work. After the new CIS is selected, the CIS and AMI project teams will collaborate to carefully define interface requirements for each software system.

In terms of procurement, the CIS project is ahead of the Companies' MDMS project. As the proposed AMI Extended Pilot Testing is being conducted in 2011, the CIS product should achieve higher levels of maturity, including the ability to interface with other AMI systems and vendor experience in interfacing their CIS with AMI systems.

The CIS project will continue with the Hawaiian Electric Companies selecting new software and system integration vendors through separate competitive bid processes in order to realize the objectives set forth in the Application submitted in Docket No. 04-0268. (A description of the scope of work and project schedule was provided in MECO's revised response to CA-IR-73, filed April 1, 2010 in Docket No. 2009-0163.) Estimated dates are as follows for the various phases of the CIS project:

- Vendor and System Integrator Selection: February 2010 – June 2010;
- Design (Gap/Fit): July 2010 – December 2010;
- Build: December 2010 – December 2011;
- Testing and Training: January 2012 – June 2012;
- Go-Live Support: July 2012 – September 2012.

Vendor and System Integrator Selection Phase

The following represents the activities that the Hawaiian Electric Companies have completed in the selection process:

- A Request for Information ("RFI") was issued on November 5, 2009 to eight CIS product software vendors to assist the Companies in determining and assessing the qualifications of those vendors.
- Responses were received from four software vendors and the two vendors who passed the minimum evaluation criteria set forth by the Companies were sent the Request for Proposal ("RFP") on December 11, 2009. The two qualifying vendors identified are SAP America, Inc. and Oracle USA, Inc.
- Both SAP America, Inc. and Oracle responded to the companies' RFP in mid-January 2010 and subsequently demonstrated their software to the companies during the first two weeks of February 2010.
- The Hawaiian Electric Companies are in the process of evaluating the two vendors' proposals and are forecasting to have an executed contract in place with the selected software vendor by approximately the end of the 2nd or 3rd quarter of 2010.

- The Hawaiian Electric Companies issued an RFI on December 30, 2009 to ten system integration vendors to assist the companies in determining and assessing the qualifications of those vendors.

- Responses were received from seven system integrator vendors and the five vendors who passed the minimum evaluation criteria set forth by the Hawaiian Electric Companies were qualified to receive the RFP. The top five vendors, Accenture LLP, HCL AXON, Deloitte Consulting LLP, IBM, and PricewaterhouseCoopers LLP, were sent the RFP on February 1, 2010.

- Accenture LLP and HCL AXON responded to the Hawaiian Electric Companies' RFP in early March 2010 and conducted on-site workshops with the companies in April 2010.

- The Hawaiian Electric Companies are in the process of evaluating the two vendors' proposals. Selection of the system integration vendor and the completion of a contract with that vendor is currently planned to take place sometime in the 3rd quarter of 2010.

- In addition, the Hawaiian Electric Companies issued an RFP on March 12, 2010 to obtain Quality Assurance services throughout the CIS Replacement Project. Currently, the Companies are in the process of considering and evaluating eight vendors' proposals and intends to contract with the selected vendor in approximately the 2nd quarter of 2010.

Based on the current schedule the Hawaiian Electric Companies anticipate that the design, build, and implementation of the new software will be completed approximately twenty-four months from commencement of the executed contract with the selected system integrator vendor. However, the number of phases, phase activities, and timeline may change, based on the selection of and agreements with the CIS software vendor and the system integrator.

Design Phase

The Design Phase is estimated at approximately five months. During this period, analyses to identify gaps in current business processes and functionalities as compared to the new out-of-the-box software will be performed. During this phase, Hawaiian Electric Companies' resources will work with the System Integrator to identify these gaps and resolve issues that will affect the design of the system, including the possible incorporation of the System Integrator's best business practices.

Build Phase

The Build Phase is estimated at approximately thirteen months and consists of the configuration of the software and development of enhancements and interfaces to meet the solution system requirements determined in the Design Phase. Concurrently, database conversion and test script development will begin. During this phase, Hawaiian Electric Companies' resources will assist the System Integrator with configuration, development of enhancements and interfaces, database extracts and the development of test scripts.

Testing and Training Phase

The Testing and Training Phase is estimated at approximately six months and consists of testing the configured software and training operational personnel on the system. Concurrently, mock conversions and mock cutovers will take place to prepare for deployment and minimize go-live issues. During this phase, Hawaiian Electric Companies' resources will perform several layers of tests on the system, participate in training classes to learn the new software, and participate in the mock conversions and cutovers.

Go-Live / Support

The 24-month software development and implementation phases will be completed at the go-live date. Stabilization of the system and associated processes after the go-live date may take up to a year which includes the estimated System Integrator's post go-live phase. The Hawaiian Electric Companies expect that the timeline may change, based on the timing and selection of the CIS software vendor and the system integration vendor.

CYBER-SECURITY

AMI vendors have been working to address critical security objectives necessary for key components of AMI and the Smart Grid; however, detailed requirements and criteria have yet to

be formalized. This work has been accelerated by the requirements of the American Recovery and Reinvestment Act ("ARRA") and the cyber-security standards development by the National Institute of Standards and Technology ("NIST") in the AMI and Smart Grid area.[5]

There are no specific requirement documents or applicable standards that apply directly to AMI systems. However, standards and documents have been developed that provide relevant guidance for establishing an appropriate security posture[6] including the May 2009 release of a set of cyber-security related standards and reference documents by NIST. The NIST documents included a draft set of security requirements for AMI by the AMI-SEC working group.

AMI will exponentially increase the level of connectivity that the Hawaiian Electric Companies have to the field and their customers. In addition to core AMI meter reading functions, AMI has the potential to support:

- Revenue protection and remote connect/disconnect,
- Outage Management - Fault Detection (last gasp) and restoration,
- Distributed Energy Resources (DER),
- Load Control, Time of Use (TOU),
- Demand Response (DR) programs,
- Feed-in Tariff (FIT),
- Time of Use (TOU), and
- Customer Interface applications via a Home Area Network (HAN).

These capabilities help facilitate achievement of the Smart Grid objectives, including customer participation, support for different generation, renewable energy integration, energy efficiency and more.

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[5] The Federal Energy Regulatory Commission ("FERC") is responsible under Section 1305 of the Energy Independence and Security Act of 2007 ("EISA") to adopt smart-grid interoperability standards and protocols developed through the work of the NIST. FERC issued a Proposed Policy Statement and Action Plan on March 19, 2009, which was intended to provide guidance to inform the development of a smarter grid for the nation's electric transmission system focusing on the development of key standards to achieve interoperability of smart grid devices and systems.

[6] For example, the draft FERC policy statement issued on March 19, 2009 lists a set of fundamental criteria for cyber-security and mentions EC 62433 and NIST Special Publication 800-53.

This increased connectivity and interoperability carries with it inherently higher levels of cyber-security risk. The risk level associated with AMI varies per use case. Potential impacts include financial risks to utility billing, operational risk to the stability of the grid, safety, property, and customer privacy.

Implementation of cyber-security functions and features on the Sensus Cyber-Security Roadmap have taken longer than anticipated in Hawaiian Electric's original deployment plans and are not yet fully available to Hawaiian Electric for testing. Consequently, the current AMI pilot does not reflect the fully operational security necessary for large scale production deployment of the Sensus AMI solution. An extended AMI pilot would provide Hawaiian Electric and Sensus the time necessary to conduct cyber-security testing and align with emerging guidance for establishing an appropriate security posture.

In order to examine the potential future use of the AMI network for Smart Grid functions, thorough examination of the security architecture and rigorous testing is required. (Other Sensus customers have limited the use of the AMI infrastructure to meter reading until such time as a satisfactory test of the forthcoming security features can be tested and implemented.) An extended pilot would provide the necessary time to pursue the following Cyber-Security objectives for both Hawaiian Electric and Sensus:

- Better alignment with emerging industry Cyber-Security Standards for AMI, including evaluation of necessary internal controls.
- Pilot testing of the Sensus AMI security architecture once it is available, including testing various security configuration options; weighing the pros and cons relative to performance and risk.
- Certification of the Sensus security modules and algorithms to industry standard like FIPS;
- Testing of the Sensus security management tools including key management, identity and access management, and event monitoring.
- Testing of the Sensus field tools with respect to operational and security impacts.
- Third party validation of the AMI Network and security architecture.
- Penetration testing of the Sensus AMI network, meters and servers.

Advanced Metering Infrastructure (AMI) Project

Extended Pilot Testing

Advanced Metering Infrastructure (AMI) Project

Extended Pilot Testing

Overview

On December 1, 2008, HECO submitted an application (Docket 2008-0303) to install AMI metering across HECO, MECO and HELCO ("Hawaiian Electric"). Hawaiian Electric asked the Commission to approve a contract whereby 90% of Hawaiian Electric's AMI meters and AMI network services would be provided by Sensus Metering Systems on Oahu, Maui and the Big Island. Subsequent to filing the AMI application, Hawaiian Electric continued to deploy Sensus AMI meters and monitor the performance of Sensus' products, services and processes.

During this continued performance monitoring, HECO identified a number of significant issues that prompted a change in our original AMI project plans. These issues (discussed later) were summarized for discussions with Sensus in the last quarter of 2009. These discussions formed the basis for an initiative *begun* in the first quarter of 2010 that is designed to increase the velocity at which such issues are addressed, and to allow open discussions of new issues that arise in the future.

Resolutions to some of the identified issues are scheduled to be tested in 2010 with currently available Sensus software and hardware; however, many issues must be assessed using products that will be employed on a larger scale. Some of these products (both hardware and software) are now being developed by Sensus. Hawaiian Electric is proposing the extension of the pilot testing ("Extended Pilot Testing") in order to demonstrate Sensus' ability to support large-scale AMI operation with the functionality and performance required by Hawaiian Electric. After PUC approval, the proposed Extended Pilot Testing is expected to require approximately eighteen months to complete at an incremental cost of $2.15 million (as shown in the table below).

Totals		2011
Meters	$	753,620
MDMS	$	613,600
Network	$	30,000
Consultants	$	750,000
Total	$	2,147,220
Grand Total	**$**	**2,147,220**

A delay in the AMI Project is disappointing to both HECO and Sensus; however, this new approach is a prudent response to the issues that have arisen following HECO's initial evaluation of the Sensus AMI technology. The delay in any deployment will also allow additional time to coordinate our AMI plans with the HECO Companies' Smart Grid Roadmap, and allow closer examination of cyber-security issues. The delay will also align better with the implementation of the new CIS project and the interface requirements between the CIS and MDMS.

To facilitate the execution of the Extended Pilot Testing, Sensus has agreed to continue to provide over 3 full time equivalent resources along with all necessary support resources needed to successfully complete testing. Additional AMI network equipment needed to complete the testing will also be provided by Sensus at no additional cost to HECO.

Background

Since the filing of the AMI Application, the Hawaiian Electric Companies and Sensus Metering Systems ("Sensus") continued to operate and observe the performance of a pilot AMI system on Oahu. This work has allowed both parties to exercise and evaluate some of the desired functionality of the Sensus FlexNet technology while identifying various product and performance issues. During this same time period, the parties have found it important to address critical Cyber-Security requirements; to evaluate the intersection of AMI, Communications and Smart Grid technologies[1]; to examine the necessary interfaces with the new Customer Information System ("CIS"); and to consider the rapid evolution of national standards that are impacting all of these areas. These new

[1] Including load control, demand response, home area networks, in-home displays, various forms of electric vehicles, grid sensing/control, renewables integration support, internet gateways, high speed communication systems, etc.

challenges have prompted the Companies' to consider a period of Extended Pilot Testing and to develop a revised project plan, particularly in light of the magnitude and duration of this potential investment.

Prior Project Activities

The present AMI meter population now stands at approximately 9,400 Sensus meters and is supported by a network of 5 radio base stations[2]. The AMI meter population is supported by a backend Sensus software system called the Regional Network Interface ("RNI") located at a datacenter in Texas.

Capital and O&M funding for the AMI Project is being provided through HECO base rates and includes the following:

(1) Project Management
(2) AMI Meter purchases
(3) AMI Meter installation
(4) Periodic Meter metrology (non-AMI and AMI meters) testing
(5) Periodic Radio board testing (AMI meters)
(6) AMI System and Product Performance Monitoring
(7) Meter Data Management System ("MDMS") Pilots
(8) AMI and AMI-related research and development
(9) AMI Industry Networking and Sensus Users Group Participation

The primary focus of the pilot projects was to demonstrate Sensus' ability to provide RF coverage in urban and rural applications, test the ability of third party contractors to install the meters, and demonstrate the capability to reliably and accurately deliver timely monthly billing reads and interval data and execute two-way commands.

[2] Sensus refers to their radio base stations as Tower Gateway Base Stations or TGBs. The TGBs operate in an FCC-licensed band in the vicinity of 900 MHz.

Issues

During monitoring and performance evaluation following the initial AMI pilot project activities, HECO encountered a number of significant issues that prompted a change in our original AMI project plans. These issues (summarized below) were documented by HECO throughout this period and were discussed with Sensus in the last quarter of 2009. These discussions formed the basis for a structured test and resolution initiative (*"HECO/Sensus AMI Issues Resolution Initiative"*) in the first quarter of 2010 that was designed to increase the velocity at which known issues are addressed, and to allow open discussions of new issues that arise in the future. Currently known issues include the following categories:

1. HECO has identified certain issues associated with the performance of the AMI system. These issues include apparent data anomalies, billing read performance, interval data collection, two-way communication performance (including demand reset and firmware upgrade functionality), time-of-use data delivery and the availability and maturity of key network equipment and installation tools. It appears that some of these issues were associated with the earlier vintage meters, other equipment and software deployed during the pilot program period. Sensus improvements in meters, other equipment and software that were contemplated as part of the agreement and promised for HECO's 2011 mass deployment must be validated and tested.

2. In addition, HECO identified certain other issues associated with business processes and other areas that will be critical to ensuring that a full scale deployment goes forward securely, efficiently and economically. These issues include new developments regarding cyber security measures, hardware/software quality processes, mitigation of radio frequency interference, efficient and automated management of the AMI network, supply chains and the robustness of the backhaul communications links. Sensus improvements in these areas must be validated and tested.

3. Since the beginning of the HECO deployments, there has been a significant focus in the US on the requirements of and issues with the smart grid, including integration of renewable energy sources, the potential for demand response, and distribution automation opportunities. Sensus has agreed to refresh the previous contract to support these features. The AMI network must be tested to assure that this additional functionality can be supported.

Some of the issues were identified early in the pilot project work (e.g., interval data collection and hardware quality) while others were recently discovered (e.g., data anomalies) or became more critical to evaluate (e.g., cyber-security).

Testing in the pilot project has been limited to those features that were available to test rather than the entire range of functions and performance levels that will be required in the full-scale AMI system. Testing constraints also included products that are now considered Sensus legacy products (all fielded residential meters for example) or engineering prototypes (FlexNet Remote Portal and FlexNet Network Portal) that are unable to meet the requirements of the AMI Equipment and Services Agreement ("Agreement") applicable during full deployment. Other constraints include recent developments involving a new design approach to address some of the issues encountered by HECO (e.g., interval data collection and automatic AMI network tuning).

In 2010, areas that Sensus believes are resolved (such as meter demand reset, measurement anomalies, and radio frequency interference) will be tested in a limited test area in Kalihi, using the latest available Sensus residential and commercial/industrial meters. HECO will continue to monitor these issues in the Extended Pilot Testing.

Due to the need to be able to evaluate the full performance of the Sensus AMI system using the actual products to be installed in the full-scale AMI deployment against all the requirements of a revised Agreement that will apply to a fully deployed system, HECO and Sensus agreed that an extended pilot testing phase was necessary before committing

to a full AMI system deployment. The objectives of Extended Pilot Testing are described in the following sections.

Key Test and Evaluation Objectives

The following must be successfully demonstrated in order for the Sensus FlexNet technology to achieve the objectives of the Companies' Extended Pilot Testing.

- Reliable and secure operation in diverse geographic areas and in wide-ranging building types and construction (low-rise, high-rise, dense construction, light construction, underground, valley locations, ridge locations, regions with high radio frequency traffic and intensity, etc.)
- Delivery of mature AMI hardware and software products, systems and processes
- Delivery of quality hardware and software with useful lives that adequately support the AMI business case
- Highly reliable, secure and timely delivery of data to a utility-owned meter data management system ("MDMS")
- Capability to provide time-of-use ("TOU") data and critical peak pricing ("CPP") functionality
- Highly reliable, secure and timely two-way communication and data exchange with meters, and future customer-sited load control devices, utility-sited grid controls and sensors
- The potential for reduction of operational costs in the areas of meter reading and field services, via remote start/stop of customer service and outage response support.
- Mitigation of technology obsolescence through the ability to upgrade firmware and configure meters remotely across large population of meters
- Reliable, timely and secure delivery of event data such as outage and restoration messages, tamper detection alarms, out-of-bounds voltage reports, momentary outage statistics, etc.

Revised Project Plan

A number of key issues with the Sensus AMI technology were identified by HECO and Sensus and are being reviewed in detail with Sensus through direct project discussions and participation in the various working committees of the Sensus FlexNet Users Group (SFUG)[3].

Focused efforts by HECO and Sensus to address these issues are successfully underway and a phased test and evaluation plan is being developed by the parties. Near term testing is being supported with Hawaiian Electric's existing AMI budget and is designed to demonstrate a limited subset of AMI functionality with a small number of residential and commercial/industrial AMI meters. The current testing will provide a qualitative evaluation of the responsiveness of Sensus as a business partner in addressing some key product, processes and system issues and concerns with adequate velocity. In addition, the near-term testing provides a foundation for the proposed Extended Pilot Testing work to follow. Residential meter installations[4] to support the near term testing are complete and C&I meter installations are scheduled to begin in early May 2010. Near-term testing is scheduled to be completed by the fourth quarter of 2010.

Upon successful completion of the current testing, Extended Pilot Testing is designed to provide a comprehensive test and evaluation process, where all performance criteria in the Agreement will be addressed. Extended Pilot Testing will involve a larger, far more diverse geographic area. Testing will encompass the whole gamut of performance criteria and the latest Sensus products, services, and processes that will be memorialized in a refreshed Sensus HECO contract, employed in the full-scale deployment.

[3] Members include a range of Sensus electric customers such as the Southern Companies (Georgia Power, Gulf Power, Alabama Power, and Mississippi Power), Alliant Energy, and Portland General Electric. Other smaller electric, water and gas utilities also participate in the SFUG.

[4] Approximately 480 residential AMI meters and 288 commercial/industrial AMI meters are planned to support near term testing on Oahu.

Performance in the Extended Pilot Test will alleviate (but not replace[5]) the need for previously planned acceptance testing called for in the agreement between HECO and Sensus while giving HECO the additional time and opportunity necessary to (1) plan for integration with a new CIS, (2) assess the role of AMI in Smart Grid initiatives and (3) identify and address Cyber-Security concerns, all of which are pre-requisites for large-scale AMI deployment. The scope, cost and schedule for Extended Pilot Testing is described below.

Sensus has agreed to continue to provide an onsite project manager and IT project manager as well as Network Operations Center personnel and radio frequency interference mitigation contractors. Sensus has also assigned a senior Director of Engagement to manage all aspects of the relationship. Sensus will also provide subject matter experts needed to resolve any issues identified during testing. In addition, incremental AMI network hardware and software needed for the Extended Pilot Testing will be provided by Sensus at no additional charge to HECO.

Extended Pilot Testing Scope

In order to provide a suitable meter population and time period to evaluate the ability of the FlexNet technology to support full-scale deployment across HECO, MECO and HELCO, the Companies' estimate the need to install approximately 4,300 residential meters and 700 commercial/industrial meters on Oahu, and to conduct a comprehensive test over a period of up to one year.

As shown in Figure 1 on the following page, the proposed Extended Pilot Testing deployment area will center around the downtown Honolulu area and expand outwards in all directions to cover diverse geographic areas (flat areas, valleys, mountains) and in wide-ranging building types (high rise, low rise, residential, commercial, light industrial), building construction (concrete, wood, metal, etc.) and enclosures, and in varying radio frequency environments.

[5] Additional FAT, SAT, and Availability Tests after Commission approval of a full-scale AMI deployment may be performed if and only if new products, processes, or systems have been introduced since the conclusion of the Extended Pilot Test.

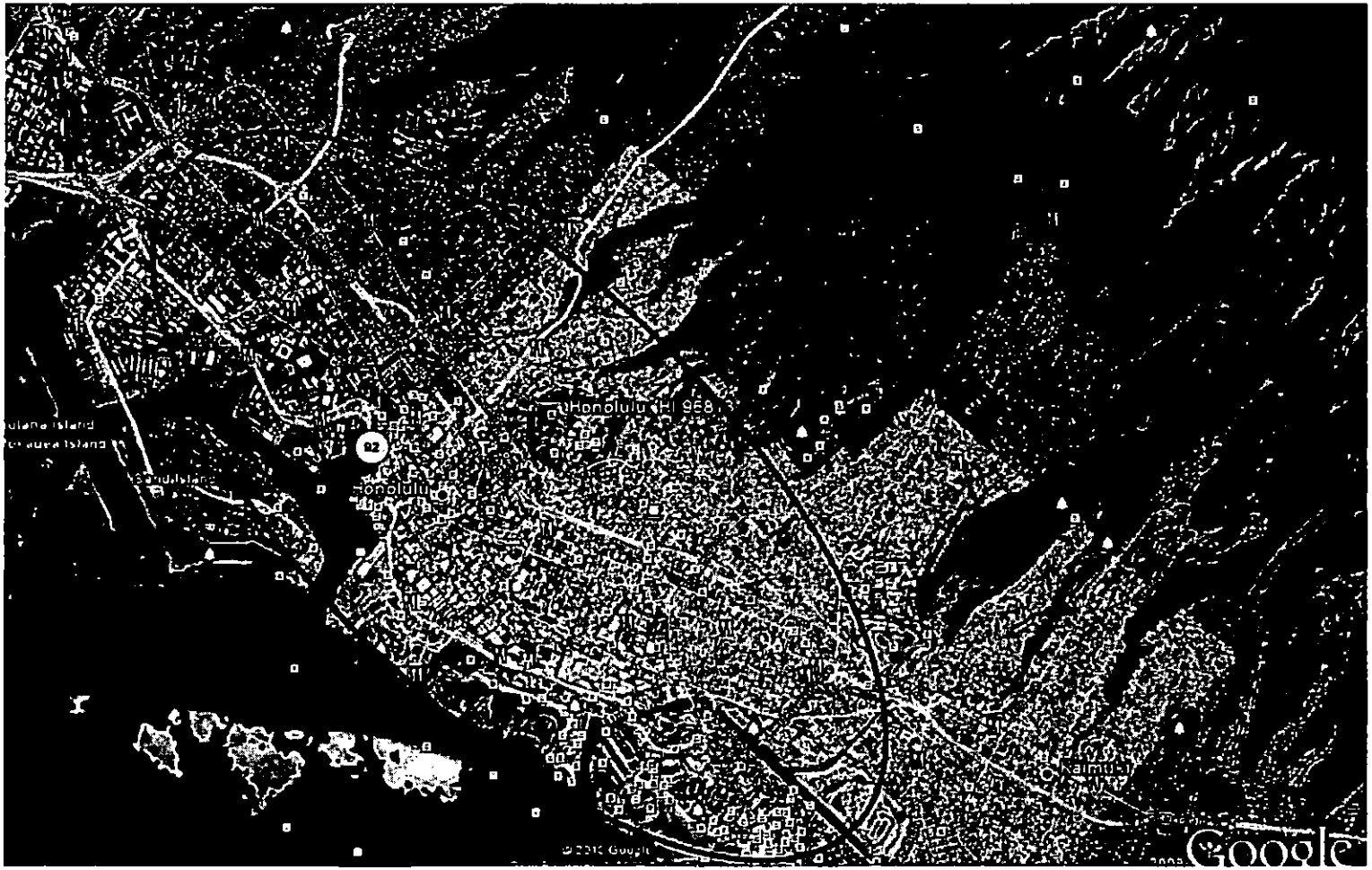
The following hardware and software would be installed in the Extended Pilot Testing:

- Installation of 5,000 additional residential and commercial/industrial ("C&I") meters, TGBs (including sites using TGBs with multi-sector antennae), mini-TGBs and additional TGB backhaul to reliably support Extended Pilot Testing. This may include additional network analysis and propagation studies by Sensus to determine suitable locations for the network hardware.
- Installation of the necessary versions of the Sensus Regional Network Interface ("RNI") software needed for the FlexNet system to meet performance requirements of the Agreement.
- Implementation of a meter data management system ("MDMS") (not a Sensus product) and automated reporting tools to allow efficient data capture and performance reporting (via existing and new Sensus and third party software tools). [6]

[6] Extended Pilot Testing will interface the AMI system to a new MDMS but not to the new CIS.

Figure 1

Proposed Deployment Area



Specific areas of focus and monitoring in Extended Pilot Testing will include the following:

- A refreshed contract to support additional functionality not included in the original agreement.
- Implementation of integration between the Sensus AMI system and the MDMS system.
- Continued monitoring and resolution of apparent data anomalies over an extended period.
- Continued observation of "as-received" failure rates and failure statistics for fielded equipment over an extended period.
- Continued observation of product delivery and ordering and return material authorization ("RMA") processes.
- Testing of all mass deployment necessary hardware, software, firmware, handheld installation tools, and remote-disconnect meters.
- Testing and performance measurement of all systems, processes, and methodologies required in a mass deployment, such as Automated Network Tuning, Load Profile data delivery, Time-of-Use ("TOU") data delivery, Demand Reset, Voltage Profile delivery, Firmware Upgrades, Remote Meter Configuration (and other two-way commands), alarm/event data delivery.
- Expert assessment of the cyber security features of the Sensus FlexNet system (hardware, software and processes including encryption, security key management, access, etc.) and comprehensive security penetration testing by third party consultants.
- Assessment of Sensus' ability to deploy, operate and maintain network assets, including TGBs, and meters, in a manner that will be a proxy for expected

conditions in mass deployment[7]. This will enable the parties to test the following conditions:

- Operation in diverse geographic areas and in wide-ranging building types and construction (low-rise, high-rise, dense construction, light construction, underground, valley locations, ridge locations, regions with high radio frequency traffic and intensity, etc.) that would be expected in a mass deployment including basements, vaults, electrical rooms, building cores, inside weatherproof enclosures, etc.
- The full range of RF interference and terrain expected in a mass deployment
- The expected message traffic and operation with appropriate meter-to-TGB ratios.
- Areas with lower customer densities

- Performance sensitivity testing at various AMI network traffic levels and operational scenarios.

Extended Pilot Testing Schedule

The preliminary project schedule for Extended Pilot Testing is shown in Figure 2 on the following page. Planning activities and lab-scale FAT and SAT testing would take place in 2010 while hardware and software procurement, installation and field testing would occur in 2011, provided that Commission approval is granted.

To prepare for Extended Pilot Testing, the Companies' are developing RFPs for the MDMS and a System Integrator ("SI") who will be responsible for AMI-to-MDMS integration. This activity will build on previous MDMS pilot and demonstration activities conducted by HECO. Upon PUC approval of Extended Pilot Testing, the Companies would competitively select the MDMS and SI vendors to allow the MDMS implementation to be initiated as soon as possible. Meter procurement and installation

[7] Including active detection and mitigation of cyber security issues as it relates to the design and operation of the Sensus AMI System.

would occur in parallel to MDMS selection and implementation to allow the timely deployment of hardware and software for Extended Pilot Testing.

A significant number of test procedures must be developed for the Extended Pilot Testing. In general, HECO plans to develop procedures and plans which allow tests to be conducted in parallel and with smaller numbers of meters initially. By doing so, some aspects of the Extended Pilot Testing could occur well in advance of the full meter deployment. Functional Acceptance Testing ("FAT") will be a combination of laboratory and field tests and will leverage the work currently being done on the AMI project.

HECO plans to increase AMI network traffic at the appropriate points in the Acceptance Testing by reconfiguring such parameters as meter data intervals (for example, reducing a typical interval setting from 60 minutes to 5 minutes), meter resolution parameters (such as 0.001 kWh versus 1 kWh resolution) and meter transmit rates

HECO plans to perform testing in the lab as well as in the field at various scales and in parallel where possible in order to increase the probability of success once the full complement of 5,000 new AMI meters are fielded. This type of testing approach will allow the maximum amount of useful information to be gained early in the testing phase. Problems can be identified more quickly, and iterative steps (such as temporarily halting meter installations or ongoing tests if necessary) can be taken while problems are resolved.

Initial onsite FAT and SAT testing that can be performed in a lab setting would start in the third quarter of 2010 while field FAT and SAT would be executed over a one year period starting in the first quarter of 2011. The total project timeline is approximately 18 months. Meter installations would involve existing company personnel to the extent resources are available and supplemented as needed by outside contractors in order to maintain a reasonable pace of progress. The typical delivery time for AMI meters is 10-12 weeks after receipt of order.

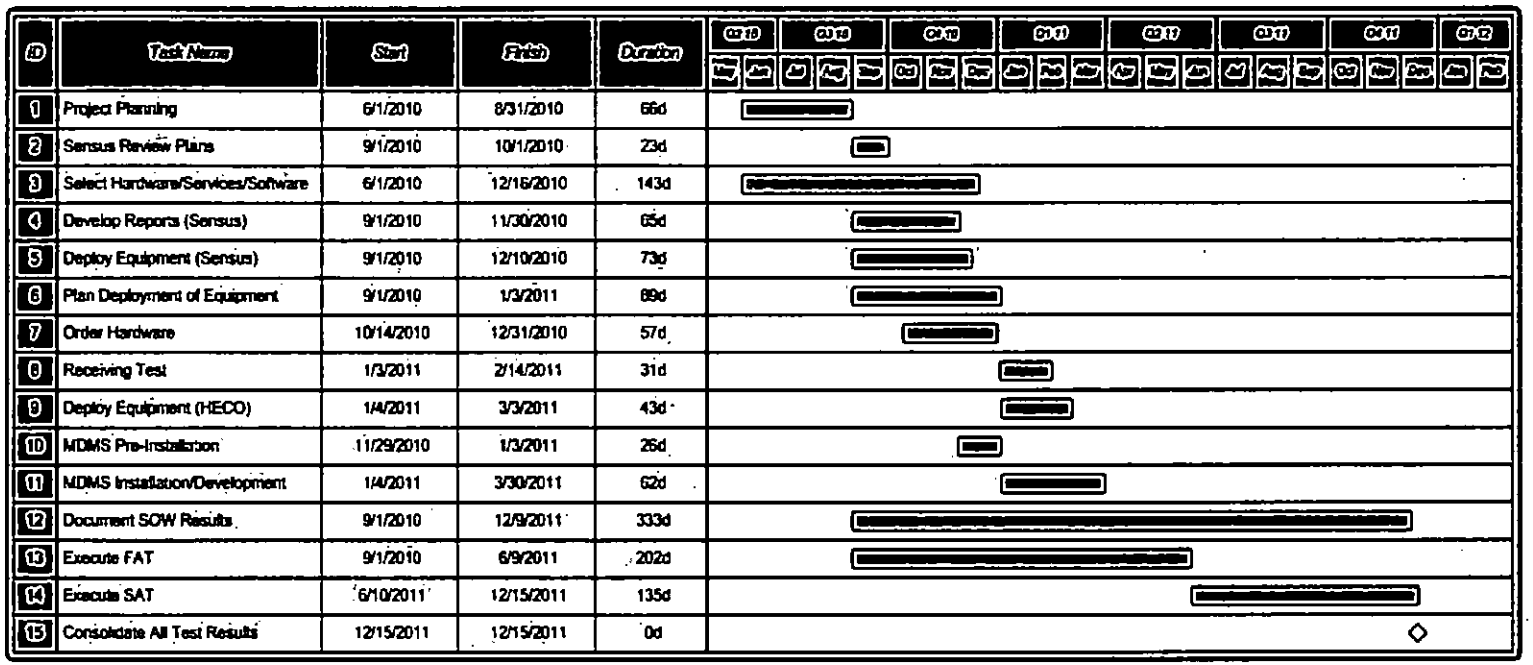
To support HECO's expanded testing, Sensus plans to install additional radio base stations (TGBs) at two sites. Three TGBs using sectorized antennae will be installed at a new downtown Honolulu location and two additional sectorized antennae will be added to the existing Prince Kuhio location. Upgrades of the Prince Kuhio site would be accomplished in a short timeframe and the acquisition and installation of equipment at the new radio base station site would be performed in parallel with procurement activities, test plan development and meter installations.

Figure 2
Extended Pilot Testing *Preliminary* Project Schedule

Sensus AMI Project

Extended Testing Timeline

ID	Task Name	Start	Finish	Duration
1	Project Planning	6/1/2010	8/31/2010	66d
2	Sensus Review Plans	9/1/2010	10/1/2010	23d
3	Select Hardware/Services/Software	6/1/2010	12/16/2010	143d
4	Develop Reports (Sensus)	9/1/2010	11/30/2010	65d
5	Deploy Equipment (Sensus)	9/1/2010	12/10/2010	73d
6	Plan Deployment of Equipment	9/1/2010	1/3/2011	89d
7	Order Hardware	10/14/2010	12/31/2010	57d
8	Receiving Test	1/3/2011	2/14/2011	31d
9	Deploy Equipment (HECO)	1/4/2011	3/3/2011	43d
10	MDMS Pre-Installation	11/29/2010	1/3/2011	26d
11	MDMS Installation/Development	1/4/2011	3/30/2011	62d
12	Document SOW Results	9/1/2010	12/9/2011	333d
13	Execute FAT	9/1/2010	6/9/2011	202d
14	Execute SAT	6/10/2011	12/15/2011	135d
15	Consolidate All Test Results	12/15/2011	12/15/2011	0d



Milestone ◇

Task Bar

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EXHIBIT B
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Extended Pilot Testing Estimated Cost

The incremental costs for the proposed Extended Pilot Testing project is estimated at $2.15 million, as shown below in Table 1. Further cost details are presented in Table 2 on the following page.

Table 1 – Project Cost Summary

Totals		2011
Meters	$	753,620
MDMS	$	613,600
Network	$	30,000
Consultants	$	750,000
Total	$	2,147,220
Grand Total	**$**	**2,147,220**

Meter costs include the cost of removing the existing meters, the installation labor and capital costs to install the new Sensus AMI meters. MDMS costs include the cost of the software license, maintenance fees, system implementation and integration and the capital cost of computer servers. AMI network fees would continue to be funded through base rates; however, there is a small amount budgeted for the installation of Sensus network devices on utility assets (i.e. poles, substations, etc.). Consultant costs include the cost of cyber security experts who would perform an assessment and perform penetration of the Sensus technology, products and processes and technical support consultants who would supplement internal resources to review test plans and to provide expertise in radio frequency communications.

Project management, planning, testing oversight and regulatory support would be provided under base rates (i.e. not incremental costs).

Table 2 – 2011 Estimated Costs

Cost Category	Total Amount ($000)	HECO ($000) [1]	HELCO ($000) [1]	MECO ($000) [1]
Deferred Costs				
MDMS	320	216	56	48
System Integrator [2]	250	169	44	37
Cyber–Security Consultant	500	337	88	75
Technical Support Consultant	250	169	44	37
Network [3]	30	30		
Total	1,350	921	232	197
Capital Costs				
AMI Meters	652	652		
MDMS Servers	44	44		
Total	696	696		
Other Costs				
Meter Boxes [4]	43	43		
Meter Removal [5]	58	57		
Total	101	100		
Grand Total	2,147	1,717	232	197
SUMMARY ($000)				
Meters	$ 754	$ 754	$ -	$ -
MDMS	$ 614	$ 428	$ 100	$ 85
Network	$ 30	$ 30	$ -	$ -
Consultants	$ 750	$ 506	$ 132	$ 112
Total	$ 2,147	$ 1,718	$ 232	$ 197

[1] Allocation derived from customer counts for each utility – HECO (67.46%); HELCO (17.59%); MECO (14.95%).

[2] Includes costs to integrate hosted MDMS to Sensus RNI.

[3] Incremental cost for network services (installation cost of two mini-TGB network devices on Oahu).

[4] Cost to replace or repair damaged meter boxes when removing old meter. Costs are accounted for as Distribution Operation expense, and will be expensed in the year incurred. No special accounting treatment for these costs is requested..

[5] All Labor costs associated with removal of the 5,000 existing meters is reflected as cost of removal (estimated at $57,389) as a charge to accumulated depreciation, consistent with the accounting for the costs associated with retiring or replacing other assets. Installation and removal costs associated with meters that fail during the testing (estimated at $971) would expensed as Distribution Operation expense.

Extended Pilot Testing Test Plans[8]

Extended Pilot Testing would rely on the methodologies that will be described in an *amended AMI Equipment and Services Agreement*[9] ("Amended Agreement") that will be executed by the parties at a later date.

Exhibit H of the Amended Agreement will provide guidance on test plans, procedures, and documentation as well as the roles and responsibilities of HECO and Sensus. Specific test plans and procedures will be mutually developed and agreed by HECO and Sensus in collaboration to guide the proposed testing. The results of the testing will be documented and provide a means to evaluate the Sensus AMI System's ability to achieve the required functionality and performance levels. Each test procedure will define the pass/fail criteria.

Extended Pilot Testing Goals

The objective of Extended Pilot Testing Acceptance Tests (Exhibit H) is to ensure that the AMI System will deliver the functionality required by the Statement of Work (Exhibit F) and meet the Specifications (Exhibit E). The testing shall also demonstrate that all AMI system components comply with the Published Specifications. During Extended Pilot Testing, HECO has the right to test all components and features of the AMI System.

The Acceptance Tests consists of three parts:

A. Functional Acceptance Test ("FAT"): Verifies proper installation and configuration, and that the *individual* AMI System components meet the requirements of Exhibit C (HECO IT Security Requirements), Exhibit E (Performance Specifications) and Exhibit F (Statement of Work). Laboratory testing will be included as part of the FAT.

[8] The completion of the Acceptance Testing in the Extended Pilot Testing does not preclude HECO from performing additional FAT, SAT, and Availability Tests after Commission approval of a full-scale AMI deployment in the future. HECO will perform such tests at its discretion and will rely on prior FAT/SAT/Availability Testing results and experience for products, processes and systems that have not changed in the period subsequent to completion of the Extended Pilot Testing.

[9] The original Agreement was executed on October 1, 2008.

B. System Acceptance Test ("SAT"): Verifies performance, functionality and proper integration of the AMI System and will involve tests using multiple, concurrent operations at various activity levels.

C. Availability Test ("Availability Test"): Verifies that the AMI System meets operational availability requirements.

Extended Pilot Testing Evaluation

For each part of the Acceptance Tests (FAT, SAT and Availability Test), a pass/fail score will be generated by HECO Sensus must demonstrate the timely ability to meet all the functional specifications of the AMI System (as defined in the Agreement) and achieve persistent performance levels per the specifications.

Success in Extended Pilot Testing will be the result of achieving success in all three phases (FAT, SAT and Availability Testing) of Acceptance Testing and completing this in a defined overall time frame.

Summary

Hawaiian Electric proposes to initiate an Extended Pilot Testing phase in order to comprehensively validate Sensus' AMI technology, using products, services, and processes that have matured over the past 3 years. The Extended Pilot Testing is currently planned for a one year time period (2011) with a phased testing approach that will require smaller numbers of meters in the initial testing and increasingly larger amounts of meters over time, up to the proposed 5,000 meter test population. Successful completion of this rigorous test process will ensure that the Sensus technology can provide the necessary AMI functionality while demonstrating the ability to achieve the performance levels required by Hawaiian Electric.

In the meantime, near-term testing with Sensus is helping to build the foundation for the proposed Extended Pilot Testing and providing time for increased maturity levels of Sensus AMI products and systems while setting clear expectations for the Extended Pilot Testing..

Extended Pilot Testing Estimated Costs - 2011

Cost Category	Total Amount ($000)	HECO ($000)[1]	HELCO ($000)[1]	MECO ($000)[1]
Deferred Costs				
MDMS	320	216	56	48
System Integrator[2]	250	169	44	37
Cyber–Security Consultant	500	337	88	75
Technical Support Consultant	250	169	44	37
Network[3]	30	30		
Total	1,350	921	232	197
Capital Costs				
AMI Meters	652	652		
MDMS Servers	44	44		
Total	696	696		
Other Costs				
Meter Boxes[4]	43	43		
Meter Removal[5]	58	58		
Total	101	101		
Grand Total	2,147	1,718	232	197
SUMMARY ($000)				
Meters	754	754		
MDMS	613	428	100	85
Network	30	30		
Consultants	750	506	132	112
Total	2,147	1,718	232	197

[1] Allocation derived from customer counts for each utility – HECO (67.46%); HELCO (17.59%); MECO (14.95%).

[2] Includes costs to integrated hosted MDMS to Sensus Regional Network Interface (RNI).

[3] Incremental cost for network services (installation cost of two mini-TGB network devices on Oahu).

[4] Cost to replace or repair damaged meter boxes when removing old meter. Costs are accounted for as Distribution Operation expense, and will be expensed in the year incurred. No special accounting treatment for these costs is requested.

[5] All labor costs associated with removal of the 5,000 existing meters is reflected as cost of removal (estimated at $57,389) as a charge to accumulated depreciation, consistent with the accounting for the costs associated with retiring or replacing other assets. Installation and removal costs associated with meters that fail during the testing (estimated at $971) would be expensed as Distribution Operation expense.